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(54) GRINDER

SPECIFICATION

1. TITLE OF THE INVENTION

Grinder

2. CLAIMS

1. A grinder comprised of a rotary disk having a mount to a rotary shaft and provided with an engagement part, a holder detachably engaged with said engagement part, and grinding/polishing members detachably implanted in said holder, characterized in that said grinding/polishing members are comprised of flexible materials and are arranged parallel to the rotary shaft radially at intervals in a slanted state, the front ends of said grinding/polishing members bend due to rotation of the rotary shaft to form a work surface, and the bent back sides of said grinding/polishing members are provided with bending stop members.

2. A grinder as set forth in claim 1, wherein said grinding/polishing members are comprised of suitable numbers of sheets of sandpaper overlaid and bundled to form predetermined thicknesses and are replaceably attached to said holder in standing states.

3. A grinder as set forth in claim 1 or 2, wherein said grinding/polishing members are attached to the holder so as to stick out by being inserted from the back side into insertion slots formed passing through it and are arranged in slanted states with the outer circumference parts at forward positions in the rotational direction of the holder and with center parts offset in radial axes from the center point of the holder.

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4. A grinder as set forth in claim 2 or 3, wherein said grinding/polishing members have base parts gripped by bundling pieces having bent tabs and guides.

5. A grinder as set forth in claim 2, 3, or 4, wherein said grinding/polishing members have at least insert slots in each sheet member of the overlaid and bundled sheet members and movement stop pieces are inserted in the insertion slots to bundle the sheet members together.

6. A grinder as set forth in claim 2, 3, 4, or 5, wherein said bending stop members are abutting pieces comprised of plate-shaped spring members.

7. A grinder as set forth in claim 2, 3, 4, or 5, wherein said bending stop members are abutting pieces comprised of hard plastic plates and are overlaid with the base parts of said grinding/polishing members.

8. A grinder as set forth in claim 5, 6, or 7, wherein said grinding/polishing members are flexible sheet-shaped members having base parts gripped by bundling pieces and spacers are arranged interposed between the sheet-shaped members to form clearances.

9. A grinder as set forth in claim 6, 7, or 8, wherein said grinding/polishing members are restricted by tongue pieces raised at suitable locations around the insertion slots formed in the holder and positioned at slants.

10. A grinder as set forth in claim 8 or 9, wherein said rotary disk has an elastic plate member arranged interposed between it and the holder to be fit into its engagement part so as to elastically support the base parts of said grinding/polishing members.

3. DETAILED DESCRIPTION OF THE INVENTION

The present invention relates to a rotary grinder used for surface treatment of surfaces, painted surfaces, and other polishing surfaces of vehicles and other objects, for example, for removing dirt from the surfaces or cleaning, grinding, and polishing work.

In general, as rotary grinders used for removing paint, rust, and other deposits or polishing surfaces, there are known types which arrange disk-shaped grindstones or sandpaper in a plane orthogonally intersecting the rotary shaft and brush types with steel wires implanted with front ends forming a planar working surface, but since the workpieces are hard, the wear is heavy and the service life is short. Due to local wear loss, the work efficiency drops. At high speed rotation, the heat of friction is also great. Continuous work is therefore no longer possible and the surface treatment work

becomes poor. In addition, there is a detrimental effect on the polishing members, so the service life becomes extremely short. Further, the polishing members easily break and fly off. The polishing members therefore often have to be replaced.

The present invention has as its object to provide in an inexpensive form a rotary grinder which suitably eliminates these defects of the prior art, reduces as much as possible the phenomenon of wear, prevents breakage of the grinding members, forms a uniform grinding surface by centrifugal force, enables grinding/polishing work by uniform wear, is free from clogging, has a cooling effect, and is adaptable to higher speeds.

Still further, an object of the present invention is to provide a grinder which improves the state of contact of the grinding/polishing members with the treated surface, remarkably improves the work efficiency, is safe and easy to handle, and is suitable for saving power.

The present invention provides a grinder comprised of a rotary disk having a mount to a rotary shaft and provided with an engagement part, a holder detachably engaged with said insert, and grinding/polishing members detachably implanted in said holder, characterized in that said grinding/polishing members are comprised of flexible materials and are arranged parallel to the rotary shaft radially at intervals in a slanted state, the front ends of said grinding/polishing members bend due to rotation of the rotary shaft to form a work surface, and the bent back sides of said grinding/polishing members are provided with bending stop members.

Explaining the present invention by embodiments with reference to FIG. 1 to FIG. 4, the invention provides a rotary grinder comprised of a rotary disk 2 having a mount 1 to a rotary shaft of an electrically driven or other power tool (not shown) and provided with a recessed engagement part 3, a holder 5 holding flexible grinding/polishing members comprised of polishing members 6 comprised of sandpaper etc. and engaged with said engagement part 3, and a fastening screw 7 used for fastening it to the rotary disk 2.

Said polishing members 6 are comprised of suitable numbers of sheets of flexible sandpaper overlaid in a sandwich manner with first ends able to freely move and with other ends bundled by movement stop pieces 11 so as to form predetermined thicknesses. These are arrayed in standing states on the holder 5, that is, parallel to the rotary shaft radially at intervals, and are designed to be able to be attached to the holder 5 in a replaceable manner. For example, the polishing members 6 are inserted

from the back side of the holder 5 into insertion slots 8 provided passing through it and are held attached in projecting states at the front side so as not to detach. The polishing members 6 are arranged in slanted states with outer circumference parts at forward positions in the rotational direction of the holder and with center parts offset in radial axes from the center point of the holder. Due to the rotation of the rotary disk, the front ends of the grinding/polishing members bend to form a work surface. Further, the back sides of said polishing members 6 in the rotational direction are provided with bending stop members 4 for controlling the bent shapes of the polishing members, for example, plate-shaped spring members or hard plastic plates or projecting pieces raised from the holder 5 as abutting pieces.

These polishing members 6 and bending stop members 4 are provided with insertion slots 17 at the base parts. Bundling/movement stop pieces 11 with flanges 11' are inserted through these insertion slots 17 to prevent the polishing members 6 from detaching. The movement stop pieces 11 may also be provided with bent tabs 12 or guides/stop pieces to grip the base parts of the sandpaper and strengthen the bundling. If necessary, an adhesive etc. may be used for fastening.

Further, the bending stop members 4 are made lengths up to about the middles of the polishing members 6 sticking out from the top surface of the holder 5 in view of the polished object or its hardness/softness or due to the little breakage and consumption of the polishing members 6. It is also preferable to give the front ends somewhat rounded curled surfaces 4'. Whatever the case, the bases of the sandpaper are fixed in place and supported so as not to detach from the holder 5. The front ends sticking out from the holder 5 slant downward in the rotational direction and overlap. The grinding surfaces of the plurality of sheets of sandpaper are shifted by small increments to be exposed at the treatment surface. They come into good contact and are successively worn in a uniform manner to enable effective use.

Note that the holder 5 is comprised of a disk-shaped cover member having a conical surface and formed with a recess at the back side and is fastened to the rotary disk 2 by a fastening screw 7. A plate-shaped disk or plastic type in which the polishing members 6 are embedded is used. Further, it is also possible to raise tabs or other engagement pieces 9 for integral provision as tongue pieces for stopping the sandpaper movement stop pieces 11 of the polishing members 6 around the insertion slots 8. It is also effective to hook the movement stop pieces 11 by the engagement pieces 9.

Further, interposing between the rotary disk 2 and the holder 5 engaged with the engagement part 3 an elastic plate 10, for example, a rubber plate, plastic plate, or soft metal plate to press and supporting the base parts of the polishing members 6 of the grinding/polishing members is rational for reinforcing fastening.

Further, the inside surface of the engagement part 3 has a conical bottom. A mount 1 comprised of a boss is fit at its center. This is provided with a screw hole 13 for the fastening screw 7.

In the figure, 16 indicates a recess provided at the center of the holder 5 and into which the head of the fastening screw 7 is buried. Reference numerals 14 and 15 are insertion holes.

In the specific example of FIG. 5, the holder 5 is made by punching and pressing. Engagement pieces 9, 9 are formed as engagement tabs around the insertion slots 8. One of the engagement pieces 9 can be bent and inserted into corresponding movement stop piece 11 of the polishing members 6 so as to join them integrally. The polishing members 6 are designed to be bent to suitable angles of inclination when contacting the workpiece surface along with rotation of the holder 5.

Note that by making part or all of the polishing members 6 in accordance with need nylon brushes or felt or using members to which polishing strips are attached, it is possible to use the grinder for various types of other applications as a polisher, buffer, or other finishing or cleaning brush. That is, it possible to insert the holder 5 to which polishing members 6 are attached sticking out at intervals substantially radially into the engagement piece 3 of the rotary disk 2 and fasten it by the fastening screw 7, then connect the mount 1 of the rotary disk 2 to the rotary shaft of a power tool and drive it to rotate so as to bring the front ends of the polishing members 6 into contact with for example a painted surface for use for stripping and polishing work. In this usage, the polishing members 6 are flexible and are pressed and bent in the rotational direction resulting in good contact and less wear. When worn and damaged, it is possible to detach only the polishing members 6 or the members along with the holder 5 for replacement or reuse by a simple setting operation.

In FIG. 6 to FIG. 8, the engagement pieces 9 formed on the holder 5 are bent vertically downward or bent downward or upward given angles of inclination to serve also as stop pieces of the movement stop pieces 11 in accordance with need and are designed to suppress rotation of the holder 5 and the slant of the polishing members 6 during work along with the bending stop members 4. They enable more stable

polishing/grinding work and also serve as reinforcement pieces for the bending stop members 4.

In FIG. 10 and FIG. 11, the sandpaper bundled polishing members 6 are combined with the bending stop members 4 into block shapes by the movement stop pieces 11. In the specific example of FIG. 12, spacers 18 are interposed between the polishing members 6 to form clearances and enable adjustment of the bendability.

The present invention provides grinding/polishing members made of flexible materials implanted in a holder of a rotating rotary disk. Due to rotation of the rotary disk, the front ends of the grinding/polishing members bend to form a work surface. Bending stop members are added at the bent back sides of the grinding/polishing members. Therefore, the polishing parts rotating at a high speed are set at a forward leaning angle. Further, due to the bending stop members, these do not overly bend, so there are few cases of breakage. The parts bend in the rotational direction to enable surface grinding/polishing actions to be performed efficiently without the side surfaces contacting the work surface from the frontmost surface to the rearmost part. The contact of the work surface is good, the wear of the polishing parts is small, and there is no breakage either. There is less consumed parts, the contact work is performed economically and ideally, and the durability is great as well. There is no clogging even with continuous use. There is an air cooling effect and little heat of friction. Use as a tool enabling power savings is possible. Even with overlaid polishing parts, good conditions are copied. Use on an even basis from one end to the other end with gradual wear is possible. The abrasion of the polishing parts is also uniform and balanced. Mounting as an attachment for a power tool is also good. Handling is safe and handy, the work efficiency is greatly improved, maintenance is easy, the structure is simple making this suitable for mass production, and other effects are exhibited.

4. BRIEF DESCRIPTION OF THE DRAWINGS

The drawings shall embodiments of the present invention, wherein FIG. 1 is a side view, FIG. 2 is a plan view, FIG. 3 is a cutaway side view along line I-I of FIG. 2, FIG. 4 is a perspective view showing the separated state, FIG. 5 is an enlarged bottom view of a holder having polishing members, FIG. 6 to FIG. 9 are partial enlarged cross-sectional views of other embodiments along the line II-II of FIG. 5, FIG. 10 and FIG. 11 are perspective views of polishing members, and FIG. 12 is a vertical cross-sectional view of another embodiment.

1... mount, 2... rotary disk, 3... engagement part, 4... bending stop member, 5... holder, 6... polishing member, 7... fastening screw, 8... insertion slot, 9... engagement piece, 10... elastic plate, 11... movement stop piece, 12... bent tab, 13... screw hole, 14, 15... insertion holes, 16... recess, 17... insertion slot, 18.... spacer.

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⑭ グライнда

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明 細 書

1. 発明の名称 グライнда
2. 特許請求の範囲

1. 回転軸への装着部がある回転ディスクに、嵌合部を設け、該嵌合部にホルダーを挿脱自在に嵌合せしめると共に、このホルダーに研削乃至研磨材を着脱自在に植設したものにおいて、前記研削乃至研磨材が可撓性材から成り、回転軸に平行で放射線状に間隔を置いて傾斜状態に配備され、回転ディスクの回転で前記研削乃至研磨材の先端部が屈曲して作業面を形成するようにし、且つ前記研削乃至研磨材の彎曲背面側に可曲阻止部材を添設したことを特徴とするグライнда。

2. 前記研削乃至研磨材が、サンド・ペーパーの適宜枚数を重合集束して所定厚さに形成したものから成るものであつて、直立状態で前記ホルダーに交換可能に装着されたものである特許請求の範囲オ1項記載のグライнда。

3. 前記研削乃至研磨材が、ホルダーに貫通形成した嵌挿穴に裏側から挿入されて突設装着されているものであつて、外周部分がホルダーの回転方向に対し前方位置にあり、中央部では放射線軸をホルダー中心点からずらせて傾斜状態に配備したものである特許請求の範囲オ1項又はオ2項記載のグライнда。

4. 前記研削乃至研磨材が、折曲爪及びガイドを有する集束片で基根部を挾持したものである特許請求の範囲オ2項又はオ3項記載のグライнда。

5. 前記研削乃至研磨材が、板状材を複数重合したものの各板状材に少なくとも挿通孔を有し、この挿通孔に移動阻止杆を嵌入して集束したものである特許請求の範囲オ2項、オ3項又はオ4項記載のグライнда。

6. 前記可曲阻止部材が、板状のパネ部材から成る当片である特許請求の範囲オ2項、オ3項、オ4項又はオ5項記載のグライнда。

7. 前記可曲阻止部材が硬質合成樹脂板の当片

であつて、前記研削乃至研磨材の基根部に重ね合わせたものである特許請求の範囲オ2項、オ3項、オ4項又はオ5項記載のグラインダ。

8. 前記研削乃至研磨材がその基根部を集束片で挟持した可撓性板状材であつて、各板状材間にスベータを介在配備して隙間を形成したものである特許請求の範囲オ5項、オ6項又はオ7項記載のグラインダ。

9. 前記研削乃至研磨材が、ホルダーに穿設された嵌挿穴のまわり通所に引き起し穿設された舌片に規制されて傾斜位置決めされるものである特許請求の範囲オ6項、オ7項又はオ8項記載のグラインダ。

10. 前記回転デスクが、嵌合部内に装入されるホルダーとの間に弾性板部材を介在配備され前記研削乃至研磨材の基根部を弾性的に圧支したものである特許請求の範囲オ8項又はオ9項記載のグラインダ。

3. 発明の詳細な説明

本発明は、車輛など各種物品の表面、塗装面

形成し平均的な摩耗で研削乃至研磨作業を可能にし目詰まりもなく冷却効果もあつて高速化にも適応した回転グラインダを安価な形態で提供することを目的としたものである。

さらにまた、本発明の目的は研削乃至研磨材の被処理面に対する接触状態の当りを良好にし作業性を著しく向上し安全で取扱い容易で電力省力化に適したグラインダとすることにある。

本発明は、回転軸への装着部がある回転デスクに、嵌合部を設け、該嵌合部にホルダーを挿脱自在に嵌合せしめると共に、このホルダーに研削乃至研磨材を着脱自在に植設したものにおいて、前記研削乃至研磨材が可撓性材から成り回転軸に平行で放射線状に間隔を置いて傾斜状態に配備され、回転デスクの回転で前記研削乃至研磨材の先端部が展曲して作業面を形成するようにし、且つ前記研削乃至研磨材の彎曲背面側に可曲阻止部材を添設したことを特徴とするグラインダである。

本発明を実施例につきオ1図乃至オ4図を参

その他の研磨面の表面処理、例えば表面の汚れをとつたり、清掃、研削、研磨作業に用いられる回転グラインダに関するものである。

一般に塗装、錆、その他の附着物などのはがし、或いは表面研削に用いられる回転グラインダは、円板状の砥石又はサンド・ペーパーを回転軸に直交した平面に配備したものや、鋼線を植設してその先端で平面的作業面を形成するブラシタイプのものが知られているが、作業対象物が硬質体であるために摩耗が激しく耐用寿命も短かいし、局所的な摩損で作業能率の低下をきたし高速回転では摩擦熱も大きく連続作業ができなくなつて表面処理作業が悪くなるばかりか研磨材に悪影響をおよぼし耐用年数は極端に短くなるし、しかも研磨材部が切損飛散しやすくひんばんに研磨材の更新を余儀なくされる欠点があつた。

本発明は、これら従来の欠点を適確に除去し、摩耗現象を可及的に少なくし且つ研削材の折損防止をはかり、遠心力によつて均等な研削面を

照して説明すると、電動機などの電動工具の回転軸（図示せず）への装着部1を有する回転デスク2に凹部の嵌合部3を設け、該嵌合部3に可撓性の研削乃至研磨材としてサンド・ペーパー等より構成された研磨材部6が保持されるホルダー5を嵌合し、締付螺子7をもつて回転デスク2に固着して回転グラインダとしてある。

前記研磨材部6は可撓性のサンド・ペーパーを適宜枚数サンドイツチ状に重合し、一端側は接離自在で他端側は移動阻止杆11で集束して所定厚さに形成したものをホルダー5に直立状態、即ち回転軸に平行で放射線状に間隔をおいて配列してあつて、該ホルダー5に対しては交換可能に装着できるようになっている。例えばこの研磨材部6はホルダー5に貫通されて設けた嵌挿穴8に裏側から挿入され、表側に脱抜しないで突出状態で装着保持されるが、研磨材部6の外周部分がホルダー5の回転方向に対して前方位置にあり、中央部では放射線軸をホルダー中心点からずらせて傾斜状態に配備し、回転

ディスクの回転で前記研削乃至研磨材の先端部が展曲して作業面を形成するようにしてあり、さらに前記研磨材部6の回転方向に対する背面側に研磨材部の彎曲状を制御する可曲阻止部材4例えば板状のパネ部材或いは硬質合成樹脂板若しくはホルダー5から引き起し突片などを当て片として添設してある。

これら研磨材部6と可曲阻止部材4とは基根部にそれぞれ挿通孔17を設けこの挿通孔17にフランジ11'のある集束兼移動阻止杆11が嵌挿され、研磨材部6の脱抜防止構造となっているが、前記移動阻止杆11に折曲爪12或いはガイド止め片を設けてサンド・ペーパーの基根部を挾持して集束結合を強固にし、必要に応じて接着剤などで固着することも可能である。

また前記可曲阻止部材4はホルダー5の上面に突出した研磨材部6のほぼ中間部までの長さとするのが研磨対象物やその硬軟度の関係からまた研磨材部6の破損及び消耗度も少なく先端は若干丸めたアール面4'を持たせるのがよい。

例えばゴム板、合成樹脂板、軟質金属板を介在配備して前記研削乃至研磨材の研磨材部6における基根部を押圧支持したものの方が固定強化のために合理的である。

また前記嵌合部3の内面は円錐底面を有し、中央部にボスからなる装着部1を嵌着してあり、これに締付螺子7のネジ孔13が設けられている。

図中16は凹部でホルダー5の中央部に設けられ締付螺子7の頭部を没入させる。14、15は挿入孔である。

オ5図の具体例ではホルダー5を打抜プレスで構成したもので嵌挿穴8の周囲に係止用爪として係止片9、9を形成し、該係止片9の一つを折曲げてサンド・ペーパーの研磨材部6の移動阻止杆11に嵌入し一体化結合ができるようにし研磨材部6がホルダー5の回転と共に被加工面に接触した際適宜傾斜角度に折曲げられるようになっている。

なお、研磨材部6を必要に応じて一部又は全部

いずれにしてもサンド・ペーパーの基根部は固定化されてホルダー5から抜け出ないように支持され、ホルダー5から突出した先端部は回り方向に傾倒して重合した複数のサンド・ペーパーの研削面が僅少ずつずれて処理面に露出するようにし、当りが良く平均的に順次摩耗して有効に使用できるようになっている。

なお前記ホルダー5としては円錐状面を有し裏側に凹部を形成する円板状カバー体から成るものであつて、締付螺子7で回転ディスク2に固着されるものであるが、平板状の円板或いは合成樹脂製で研磨材部6を埋設固定化するタイプのもので用いられる。また前記研磨材部6のサンド・ペーパー用の移動阻止杆11を止める爪などの係止片9を嵌挿穴8の周囲に引き起し舌片として設けて一体化できるし、前記移動阻止杆11を該係止片9に掛け止めることも有効である。

さらに前記回転ディスク2が、その嵌合部3内に装入されるホルダー5との間に弾性板10例

ナイロン製ブラシ又はフェルト、若しくは研磨帯を装着した部材を用いることでポリシヤー、バフ研磨などの仕上、清浄用ブラシとして、種種の別用途に使用することもできる。しかし、研磨材部6をほぼ放射状で間隔をおいて直立装着したホルダー5を回転ディスク2の嵌合部3に嵌挿して締付螺子7で固着したのち、回転ディスク2の装着部1を電動工具の回転軸へ連結して回転駆動させ、研磨材部6の先端面を例えば塗面に接触させながら剝離研磨作業に使用できるものであるが、この使用によつて研磨材部6が可撓性で回り方向に押し曲がり当りがよく摩耗も少なく、しかも摩耗損傷したとき、研磨材部6のみ、或いはホルダー5とともに、取外すことによつて交換し再使用できるように簡単な操作でセットできるものである。

オ6図乃至オ8図ではホルダー5に形成した係止片9を垂直に下方に折曲げ或は傾斜角度をつけて下方或いは上方に折曲げて移動阻止杆11の係止片をも必要に応じてかねた構成のもので

あつてホルダー5の回転と研磨材部6の作業中の角度を可曲阻止部材4と共に抑制できるようにしたものであり、より安定した研磨乃至研削作業を可能にし可曲阻止部材4の補強片ともなる。

オ10図及びオ11図例ではサンド・ペーパーの集束研磨材部6を可曲阻止部材4と一括して移動阻止杆11でブロック状に結合したものでオ12図の具体例ではスペーサ18を各研磨材部6間に介在させて隙間を形成し展曲性を調整できるようにしたものである。

本発明は、研削乃至研磨材が可撓性材から成り回転する回転デスクのホルダーに植設設備され、回転デスクの回転で前記研削乃至研磨材の先端部が展曲して作業面を形成するようにし、且つ前記研削乃至研磨材の彎曲背面側に可曲阻止部材を添設したので、高速回転する研磨部が前倒れ角度をつけて設置されることになり、しかも可曲阻止部材で極端に折曲がらず切損事故発生がなく回り方向に曲つて最前面より最後部に

亙るまで側面が作業面に触れる事なく表面研削、研磨作用を能率的に行い得るとともに、作業面の当りもよく研磨部の摩耗が少なく破損もなく消耗部分が少なく経済的で理想的に接面作業ができ耐久力をも大にし遅延使用でも目詰り現象がなく空冷効果があつて摩擦熱も少なく電力省力化が可能な工具として用いられるし、積層した研磨部でも良好な状態になら一端から他端まで平均して徐々に摩耗させて使用でき、研磨部分の損耗も一様でバランスがとれ電動工具類としてのアタツチメントとしても体裁良好であり、取扱いも安全便利で作業性を大巾に上げられ保守も楽になつて構成簡単で大量生産に適する等の効果がある。

4. 図面の簡単な説明

図面は本発明の実施例を示し、オ1図は側面図、オ2図は平面図、オ3図はオ2図I-I線の切断側面図、オ4図は分離状態を示す斜視図、オ5図は研磨材部を有するホルダーの拡大底面図、オ6図乃至オ9図はオ5図II-II線におけ

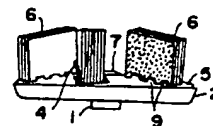
る他の実施例を示す部分拡大断面図、オ10図及びオ11図は研磨材部の斜面図、オ12図は他の実施例の縦断面図である。

1…装着部、2…回転デスク、3…嵌合部、4…可曲阻止部材、5…ホルダー、6…研磨材部、7…締付螺子、8…嵌挿穴、9…係止片、10…弾性板、11…移動阻止杆、12…折曲爪、13…ネジ孔、14、15…挿入孔、16…凹部、17…挿通孔、18…スペーサ。

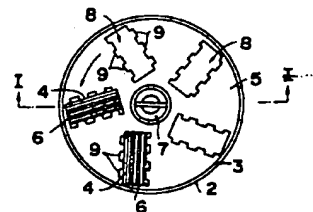
特許出願人 萩 野 乾

代理人弁理士 端 山 五 一

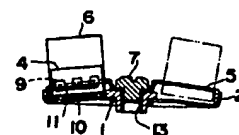
第 1 図



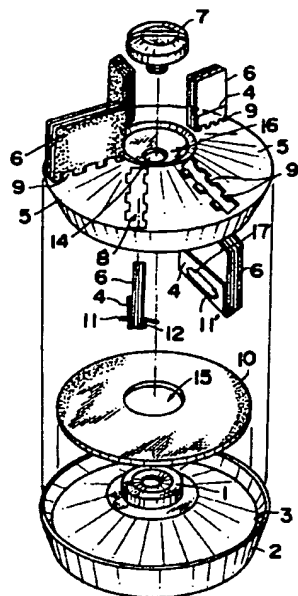
第 2 図



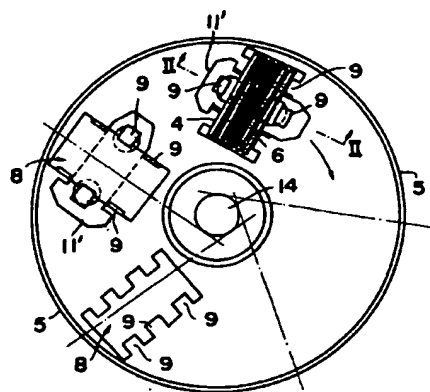
第 3 図



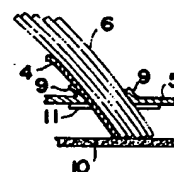
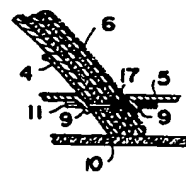
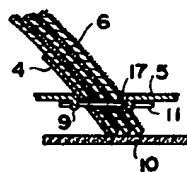
第 4 図



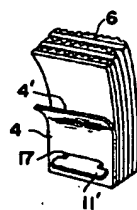
第 5 図



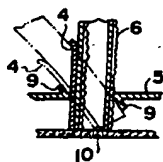
第 6 図 第 7 図 第 8 図



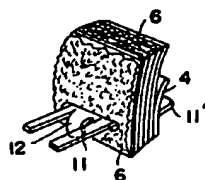
第 10 図



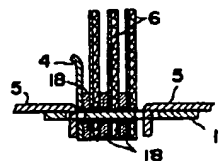
第 9 図



第11図



第 12 図



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